

CLAIMS

1. A biomolecule detecting element comprising:

an insulated gate field effect transistor having a gate electrode embedded in an insulating film;

a probe-immobilized electrode formed on the surface of said insulating film and having a biomolecular probe immobilized thereon; and

a connection wire for electrically connecting said gate electrode and said probe-immobilized electrode,

wherein the region of said probe-immobilized electrode where said biomolecular probe is immobilized is located away from immediately above said gate electrode.

2. The biomolecule detecting element according to claim 1, wherein said probe-immobilized electrode extends from immediately above said gate electrode along the film surface of said insulating film to the region where said biomolecular probe is immobilized, wherein said connection wire is connected to said probe-immobilized electrode immediately above said gate electrode.

3. The biomolecule detecting element according to claim 1, wherein said probe-immobilized electrode is disposed away from immediately above said gate electrode, and wherein said connection wire is disposed within said insulating film along the film surface.

4. The biomolecule detecting element according to any one of claims 1 to 3, wherein said biomolecular probe comprises a nucleic acid, polynucleotide, or synthetic oligonucleotide.

5. The biomolecule detecting element according to any one of claims 1 to 4, wherein said probe-immobilized electrode is comprised of one or a combination of materials selected from gold, platinum, palladium, titanium, chromium, aluminum, polysilicon, tantalum, or molybdenum.

6. The biomolecule detecting element according to any one of claims 1 to 5, wherein a transmission/reception antenna is formed in said insulating film.

7. A biomolecule detecting element comprising:

a plurality of insulated gate field effect transistors each having a gate electrode embedded in a common insulating film;

a plurality of probe-immobilized electrodes formed on the surface of said insulating film and having biomolecular probes immobilized thereon; and

a plurality of connection wires for electrically connecting the gate electrode of each of said plurality of insulated gate field effect transistors and said plurality of probe-immobilized electrodes,

wherein the region of said probe-immobilized electrodes where said biomolecular probes are immobilized is located away from immediately above said gate electrode.

8. The biomolecule detecting element according to claim 7, wherein a transmission/reception antenna is formed in said common insulating film.

9. The biomolecule detecting element according to claim 6 or 8, further comprising a computation circuit, a memory circuit, a reception circuit, a transmission circuit, and a power supply circuit.

10. The biomolecule detecting element according to claim 9, wherein said power supply circuit converts an electromagnetic wave received by said

antenna into electric power and feeds it to individual portions.

11. A method for analyzing nucleic acids using the biomolecule detecting element according to any one of claims 1 to 10, comprising the steps of:

immobilizing a single-stranded nucleic acid probe on said probe-immobilized electrode as said biomolecular probe;

introducing a sample solution containing at least one kind of nucleic acid onto said biomolecule detecting element and carrying out hybridization with said single-stranded nucleic acid probe;

introducing a washing solution onto said biomolecule detecting element and removing unreacted nucleic acid on said biomolecule detecting element;

introducing an intercalator solution onto said biomolecule detecting element and causing it to react with the nucleic acid that has become double-stranded;

introducing a washing solution onto said biomolecule detecting element and removing unreacted intercalator on said biomolecule detecting element; and

introducing a buffer solution onto said biomolecule detecting element and measuring output values of said insulated gate field effect transistor.

12. A method for analyzing biomolecules using the biomolecule detecting element according to claim 10, comprising the steps of:

putting a plurality of biomolecule detecting elements comprising said probe-immobilized electrodes having different kinds of single-stranded nucleic acid probes immobilized thereon as biomolecular probes, and a buffer solution in a reaction vessel, and receiving a signal from each of said biomolecule detecting elements using an external receiver;

introducing a sample solution containing at least one kind of nucleic

acid into said reaction vessel and carrying out hybridization with said single-stranded nucleic acid probe;

introducing an intercalator solution into said reaction vessel and causing it to react with the nucleic acid that has become double-stranded; and

receiving a signal from each of said biomolecule detecting elements using the external receiver.